Working Paper Series
Congressional Budget Office
Washington, DC

The Fiscal Multiplier and Economic Policy Analysis in the United States

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February 2015

Working Paper 2015-02

This paper is forthcoming in *Contemporary Economic Policy*. The authors received helpful comments and suggestions from Douglas Elmendorf, Jeffrey Kling, Benjamin Page, Brad Humphreys (the journal editor), and three anonymous referees.

Abstract

The recession from 2007 to 2009 sparked wide interest in the economic effects of fiscal policy. That interest is reflected in an ongoing debate over the size of the fiscal multiplier. This working paper addresses three questions: What models do economists use to estimate that multiplier? Why do estimates of it vary widely? How can economists use those estimates to judiciously analyze U.S. economic policy?

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I. Introduction

The Great Recession, which began in December 2007 and ended in June 2009, sparked wide interest in the economic effects of fiscal policy. The downturn initially provoked a flurry of papers estimating how stimulus packages such as the American Recovery and Reinvestment Act of 2009 (ARRA) would affect output and employment.[1] Later, as many policymakers in the United States and Europe sought to reduce government deficits, much attention shifted to the likely effects of fiscal consolidation (increases in taxes and/or decreases in government spending or transfers).[2] In addition, the entire period of recession and slow recovery has seen the release of numerous studies examining how changes in fiscal policy affect economic outcomes.[3]

The recent interest in how fiscal policy affects the economy is reflected in an ongoing debate over the size of the *fiscal multiplier*, the change in a nation's economic output generated by each dollar of the budgetary cost of a change in fiscal policy. The multiplier must be estimated; it cannot be observed.[4] Estimates of the fiscal multiplier vary widely, including values in excess of one and less than zero.[5]

What models do economists use to estimate the multiplier? Why do estimates of it vary widely? And how can economists use those estimates to judiciously analyze U.S. economic policy? We address the first two questions by reviewing the rapidly expanding body of academic literature and address the third question by providing an overview of how the Congressional Budget Office (CBO) uses multiplier estimates to analyze fiscal policy proposals and legislation.

II. What Models Do Economists Use to Estimate the Fiscal Multiplier?

Three types of models are often used to generate estimates of the fiscal multiplier—macroeconometric forecasting models, time series models, and dynamic stochastic general equilibrium (DSGE) models. Each type has strengths and limitations.

Macroeconometric Forecasting Models

Macroeconometric forecasting models, which underlie most of the forecasts offered to the clients of economic consulting firms, are the basis for many estimates of multipliers. The details of those models are based largely on historical relationships among aggregate economic variables and informed by theories of how those variables are determined. Because macroeconometric forecasting models emphasize the influence of the overall demand for goods and services, they

[1] For example, see Fair (2010) and Romer and Bernstein (2009).

[2] For example, see Gravelle and Hungerford (2013) and Bagaria et al. (2012).

[3] For example, see Eggertsson (2009), Taylor (2011), and Fazzari et al. (2014).

[4] Observing economic outcomes is not sufficient for determining the economic effects of a change in fiscal policy because isolating the effects would require knowing what path the economy would have taken in the absence of the policy change.

[5] For example, Van Brusselen (2009) reviewed literature on the U.S. economy and found estimates of government spending multipliers between -3.8 and +3.8 and tax cut multipliers between -4.8 and +3.0. The suggestion that multipliers can be negative, which means that cuts in spending and transfers would increase economic activity, is the argument behind some recent calls for fiscal consolidation.

tend to estimate greater economic effects from policies that bolster demand than time series models and DSGE models do.[6]

The reliability of macroeconometric projections depends heavily on the validity of the specific economic assumptions used. For example, because the models are grounded in observed historical relationships, their estimates rely on the assumption that individuals will, on average, continue to react to changes in fiscal policies in the same way that they reacted in the past. Consequently, estimates projected by such models might be unreliable when policies or economic conditions differ substantially from those of the past.[7]

Times Series Models

Time series models offer an alternative to macroeconometric forecasting models. In their most basic form, time series models, such as vector autoregression (VAR) models, summarize correlations between economic variables—such as government spending and gross domestic product (GDP)—over time.[8] Because time series models are grounded in historical data and contain little economic theory, they can be particularly useful when there is reason to believe that existing theories may be inaccurate or based on particularly unrealistic assumptions.

However, the lack of theoretical grounding makes it difficult to use time series models to assess the direction of causation between policies and the economy. This is known as the "identification" problem.[9] For example, while poor economic conditions can spur the government to enact policies aimed at stimulating economic activity, a statistical correlation between the policies and economic performance could be interpreted as indicating that policies caused the weak performance.

Two approaches are often used to identify economic causation as distinct from mere correlation. One approach—called "structural vector autoregression" (SVAR)—relies on making assumptions about the interaction of the economic variables of interest.[10] That approach is easy to implement (because it does not require specification of many behavioral relationships or extensive data gathering) and is useful when the statistical assumptions are correct. However, if the assumptions are incorrect, then the approach may lead to less reliable multiplier estimates than the most basic form of time series models. An alternative—"narrative"—approach supplements the time series analysis of aggregate data with a review of historical evidence of other sorts, such as narrative evidence from the legislative record. That alternative approach has been used most often to

[6] For a more detailed discussion of macroeconometric models—and of time series models and DSGE models—see Chinn (2013).

[7] See Parker (2011) and Auerbach et al. (2010) for a discussion of limitations that arise from the use of historical data to estimate how output responds to new and untested fiscal policies.

[8] The main difference between time series and macro models is that the latter impose *a priori* theory-based restrictions on the relationship between model variables while time series models do not impose such restrictions, at least not in their purest form.

[9] As in the case of macro models, the historical grounding of time series models can also make it difficult to assess what would happen under economic conditions substantially different from those of the past. For further discussion of limitations and complexities associated with using time series models, see Parker (2011).

[10] For a discussion of the SVAR approach, see Blanchard and Perotti (2002).

estimate the economic impact of military buildups, events that are arguably unrelated to macroeconomic conditions, but also to estimate the effects of tax changes.[11]

DSGE Models

DSGE models are also used to estimate fiscal multipliers.[12] In DSGE models, people are assumed to make decisions about how much to work, buy, and save on the basis of current and expected future values of wage rates, interest rates, taxes, and government purchases, among other things. As a result of those and other assumptions about individuals' and businesses' behavior, such models offer a clear perspective on the causal relationships among economic variables.[13]

A thorough grounding in economic theory allows DSGE models to avoid the difficulties of interpretation that arise with purely statistical approaches to analyzing data. In addition, the explicit assumptions about economic decision-making in DSGE models are less dependent on historical data than in macroeconometric models.[14] Therefore, DSGE models can be particularly useful when analyzing the effects of changes in fiscal policies that have not been observed previously.

DSGE models often include assumptions that seem at odds with important features of the real-world economy.[15] For example, such models do not usually allow for underutilized resources in an economy, such as involuntary unemployment or unused capital. In addition, people are generally assumed to have full access to credit markets so that they can borrow to maintain their consumption in the face of a temporary loss of income, and the Federal Reserve is often assumed to respond to changes in fiscal policies, thereby excluding situations in which actions by the Federal Reserve are constrained by a zero lower bound on nominal interest rates.[16]

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[11] For examples of studies focusing on military buildups, see Ramey (2011a), and Ramey and Shapiro (1998), and for discussion of the challenges associated with focusing on military buildups (namely, factors that could raise or dampen multipliers in such periods), see Ramey (2011b, p. 677). Some articles in this literature (such as Owyang et al. 2013) do not adjust results for tax increases that have often accompanied military buildups, but others make such an adjustment to generate results more applicable to the case of deficit-financed government spending (including Ramey 2011a). For examples of studies that use the narrative approach to estimate the effects of tax changes on economic activity, see Romer and Romer (2010), and Favero and Giavazzi (2012).

[12] DSGE models are "dynamic" because they focus on how an economy evolves over time, "stochastic" because they take into account that the economy is affected by random shocks (owing to technological change, for example), and "general equilibrium" because they assume that people make decisions in response to prices in the economy (such as wages and rates of return on saving) and that prices change in response to those decisions.

[13] DSGE models differ from traditional macro models in that they include micro-founded elements describing the optimal behavior of economic agents.

[14] DSGE models are generally calibrated so that macroeconomic variables, such as the total amount of labor supplied and the size of the capital stock, match the amounts in the U.S. economy, or they are estimated using aggregate data to determine some key parameters. See Fernández-Villaverde and Rubio-Ramírez (2006) for a detailed discussion of how DSGE models are estimated. See Coenen et al. (2012) for a comparison of significant model features and parameters of several DSGE models used by policymaking institutions in Canada, Europe, and the United States.

[15] For example, see Parker (2011) and Fair (2012), who criticize several modeling choices made in many DSGE models. In addition, Leeper et al. (2011) observe that a tight range for estimates of the multiplier is imposed by the assumptions and choices made by researchers when using DSGE models. See also Chari et al. (2009), who argue that DSGE models rely on so many improvised modeling assumptions that their conclusions are unavoidably ambiguous for policy analysis.

[16] DSGE models also are typically built on the assumptions that people have full information about the current economy and future economic developments and that they logically base their current decisions on a full lifetime plan. In extreme form, those assumptions imply that people anticipate that increases in government spending or decreases in taxes will eventually lead to lower

However, additional research has relaxed many of the standard assumptions of DSGE models in an effort to align those models more closely with important aspects of the economy. For example, some models incorporate so-called "hand-to-mouth" consumers. Research on consumer behavior finds that some households' spending tends to vary one-for-one with income, perhaps in part because those households have only small savings and face borrowing constraints and therefore cannot maintain their desired level of consumption when their income falls, or because some households follow simple behavior rules rather than trying to continuously determine their optimal spending and saving. Recent multiplier estimates in models with such consumers are as much as 50 percent larger than estimates generated using standard DSGE models.[17]

III. Why Do Multiplier Estimates Vary Widely?

The variation in estimates of the fiscal multiplier cannot be explained by economists' use of different types of models. Each type described above can generate a broad range of multiplier estimates. For example, Reichling and Whalen (2012) find estimates for the United States, as measured (on a cumulative basis) after eight quarters, ranging from 0.75 to 2.25 for macroeconometric forecasting models, from 0.3 to 3.5 for time series models, and from 0.5 to 2.25 for DSGE models. To better understand the variation in multiplier estimates, one must consider analytical and measurement issues, fiscal policy details, economic conditions, and how fiscal policy can affect people's confidence in the future of economic activity.

Analytical and Measurement Issues

Some variation in multiplier estimates is the result of differences in methodological choices, data sets, and (as illustrated in the previous section) underlying behavioral assumptions. For example, estimates can vary with the method used to address the identification problem and with the approach used to measure a given variable. The significance of such methodological choices is highlighted by Riera-Crichton et al. (2012), who analyze tax increases in 14 industrial countries and find a tax multiplier of 1.32 (after three quarters) using the SVAR approach and a multiplier of 2.76 using the narrative approach (owing to policy anticipation); they also produce different estimates when using alternatives to their preferred method of measuring tax policy instruments.[18]

In addition, some variation in multiplier estimates is because analyses can differ with respect to the period over which the multiplier is measured. Reported multipliers are sometimes "peak" multipliers, which represent the largest effect on output in any one quarter after a policy change, but others are "instantaneous" or "impact" multipliers (the former looks at the effect immediately following a policy change and the latter allows for a lagged response). Still others are "cumulative" multipliers, which represent the cumulative effect on output of a policy change over a given period. Measuring the cumulative effect is often important because the effects on output can reverse

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spending or higher taxes and that they raise their current saving in an attempt to offset that expected future burden. Therefore, in such models, cash transfer payments and many sorts of reductions in taxes usually have little or no effect on current spending.

[17] See, for example, Coenen et al. (2012) and Galí et al. (2007). Other researchers relax different assumptions; for example, Fernández-Villaverde (2010) develops a model that incorporates financial frictions, and Leeper et al. (2009) study the economic effects of government investment.

[18] On the role of data sets, see, for example, Ramey (2011a), who calculates different estimates depending on whether World War II is excluded from samples.

direction over time (as discussed further in Section IV). However, efforts to compare different estimates are often complicated by the fact that studies sometimes "fail to specify the exact multiplier concept used" (Auerbach et al. 2010, p. 114).[19]

An especially challenging measurement issue stems from the possibility that households and businesses act in anticipation of government spending and tax changes. The extent to which people have "fiscal foresight" can have a significant effect on multiplier estimates (Leeper et al. 2012). But that foresight is not easy to measure. Part of the difficulty is that time elapses between the point at which there is recognition of the need for policy action and the point at which tax or spending programs take effect—sometimes it is a short period, but other times it is a period of four or more quarters. Another variable dimension is what Leeper et al. (2012, p. 130) call "foresight intensity": how confident people are about pending changes. Moreover, the effects of fiscal foresight are not unambiguous; for example, the ways in which people act in anticipation of a fiscal policy change can depend on policy details and economic conditions.

Fiscal Policy Details

Looking beyond analytical and measurement issues, estimates of the fiscal multiplier can vary because the size of the multiplier depends on fiscal policy details—including the nature, duration, and timing of policy changes. Also important to multiplier estimates are people's expectations about the fiscal policy details yet to come: the future path of government spending and revenue.

As in the case of Van Brusselen (2009), the economics literature often makes a distinction between tax and government spending multipliers and frequently finds that the spending multipliers are larger than tax multipliers.[20] To understand why, consider two changes to fiscal policy—an increase in government spending and a cut in taxes, each with a budgetary cost of a dollar. The increase in government spending immediately contributes a dollar to aggregate demand, but the tax cut (or, alternatively, an increase in transfer payments) could contribute less than a dollar because it can be spent or saved (the marginal propensity to consume can be less than one). It is this difference that causes some analysts to distinguish between government spending and tax multipliers.

Theory and some empirical evidence also suggest that finer multiplier distinctions may be warranted. This includes separate multipliers for public investment and public consumption. For example, Auerbach and Gorodnichenko (2012a) find that multipliers for infrastructure spending and other types of U.S. public investment are larger than multipliers for public consumption.[21]

In addition, multipliers can vary across different fiscal policy provisions because those provisions can affect people with different characteristics, resulting in different responses. For example, tax cuts are likely to boost purchases more for lower-income households than for higher-income households.[22] That difference arises, at least in part, because lower-income households typically

[19] There are also other types of multipliers, such as present-value multipliers; see Leeper et al. (2010).

[20] For example, see also Chahrour et al. (2012) and Leeper et al. (2011).

[21] Similar results are found in recent studies that focus on public investment outside of the United States. See Gonzalez-Garcia et al. (2013) and Bruckner and Taladhar (2010). However, an earlier study by Perotti (2004) found no evidence of larger multipliers for public investment (relative to public consumption) in five countries, including the United States.

[22] For additional examples, see Zandi (2011).

consume a higher fraction of their income and because they are less able to borrow money to finance their desired consumption.

The duration and timing of fiscal policy actions can also affect the size of the multiplier. For example, Coenen et al. (2012) find that fiscal stimulus has a larger effect when it is of "moderate persistence"—namely, two or three years in duration. In particular, they suggest that a policy change of moderate duration boosts consumer spending more than a one-time action, and that some expansionary effects of an even more persistent policy initiative can be offset by concerns about rising future taxes. In addition, Christiano et al. (2011) show that multipliers are larger when all—rather than just a portion—of the government spending in a fiscal stimulus is timed to coincide with a zero-bound constraint on interest rates.[23]

The multiplier can also be affected by people's expectations about the future path of government spending and revenue. For example, consider the case of a stimulus package that increases government spending. The way people expect that package to be financed in the future—by means of changes in taxes (on labor, capital, or consumption), transfers, government spending, or a certain combination of those alternatives—represents an important set of fiscal policy details; and different assumptions about such details, including the speed of policy adjustment, will result in different multiplier estimates (Leeper et al. 2010).

Economic Conditions

Estimates of the fiscal multiplier also vary with economic conditions, including the state of the business cycle, the response of monetary policy to fiscal policy changes, and the condition of the financial system.[24]

Some recent economic research finds that the state of the business cycle affects the size of the fiscal multiplier. For example, Auerbach and Gorodnichenko (2012a) extend an SVAR model to allow for responses differentiated across recessions and expansions and use that regime-switching model to estimate a peak multiplier for government spending in the United States of 2.5 in recessions and 0.6 in expansions. That finding can be explained as follows: When the economy's labor and capital resources are close to being fully utilized, some of the effect of a fiscal stimulus could be offset by a reduction in private-sector spending that would have occurred in the absence of the stimulus (owing to a bidding up of the price of the economy's resources); however, when there are more unused resources, any such reduction is likely to be smaller and a fiscal stimulus is more likely to be magnified by additional spending by the private sector.[25]

[23] See also Coenen et al. (2012). In contrast, Cogan et al. (2010) assume that only a small fraction of an increase in government spending would occur when the short-term interest rate is at the zero lower bound and that the rest would occur after the short-term interest rate begins to rise; as a result, they estimate smaller multipliers.

[24] In addition to the economic conditions discussed in this article, which focuses on the U.S. economy, a broader discussion would include structural characteristics such as an economy's size, its openness to trade, and the nature of its exchange rate regime. For a discussion of how such characteristics affect fiscal multipliers, see Chinn (2013) and Batini et al. (2014). See also Ilzetzki et al. (2013), who classify the United States as a relatively large, closed economy according to the size of its internal market and openness to trade (they designate an economy as "closed" if foreign trade is less than 60 percent of GDP) and find that fiscal multipliers are larger in large, closed economies than in small, open economies.

[25] Some economists have suggested that interest rates must be constrained by the zero lower bound for fiscal multipliers to be larger in recessions than in expansions. However, Michaillat (2012) develops a labor-market search model with job rationing to show that there can be those larger multipliers whenever the labor market is depressed.

In a follow-up paper, Auerbach and Gorodnichenko (2012b) confirm their general results (larger multipliers in recessions than in expansions) by extending the analysis to a large number of countries that are members of the Organisation for Economic Co-operation and Development (OECD) and by using an approach known as expectations-augmented VAR. Other studies that use different types of VAR models also find fiscal multipliers are larger in times of economic slack than in robust expansions, including Fazzari et al. (2014); and Baum et al. (2012).

In contrast, Owyang et al. (2013) and Ramey and Zubairy (2014) do not find larger multipliers in times of slack when using a narrative approach to examine the effect of changes in government spending in the wake of news about military events. That contrast underscores a point made above: analysts' choices about methods, measurement, and data can play a decisive role in generating multiplier estimates. As Ramey and Zubairy (2014, p. 3) write, "Most of the differences in conclusions between our work and that of Auerbach and Gorodnichenko lie in ... the construction of impulse response functions on which the multipliers are based. In contrast to linear models, where the calculation of impulse response functions is a straightforward undertaking, constructing impulse response functions in nonlinear models is fraught with complications."[26]

Some economists—including Hall (2009), Christiano et al. (2011), Davig and Leeper (2011), and Coenen et al. (2012)—also find that the size of the fiscal multiplier depends on the response of monetary policy to fiscal policy changes.[27] Under normal economic conditions, a fiscal stimulus would increase inflationary pressure and the Federal Reserve would increase the federal funds rate as a countermeasure. However, there can be times when monetary policy is constrained by the zero lower bound and fiscal policy changes would not be offset by changes in the funds rate.[28] Indeed, the Federal Reserve kept short-term interest rates near zero as federal fiscal policymakers adopted stimulus measures during and after the Great Recession. For example, Hall (2009) finds that the government spending multiplier (after four quarters) rises from just below 1.0 to 1.7 when monetary policy is passive because the federal funds rate is at its lower bound of zero.[29]

The size of the multiplier can also be affected by the condition of the financial system. For example, using a panel of OECD countries, Corsetti et al. (2012) find larger fiscal multipliers during times of financial crisis.[30] They suggest that is because spending by the private sector is more likely to be constrained by a lack of access to credit during such times.

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[26] An even more recent paper by Riera-Crichton et al. (2014) revisits the question of whether multipliers are larger in recessions than in expansions and brings in a new dimension: whether government spending is going up or down in bad times. Using a sample of 29 OECD countries, they conclude that "the 'true' long-run multiplier for bad times (and government spending going up) turns out to be 2.3 compared to 1.3 if we just distinguish between recession and expansion. In extreme recessions, the long-run multiplier reaches 3.1."

[27] As in the case of whether multipliers vary with the state of the business cycle, Ramey and Zubairy (2014) look at episodes of increased U.S. military spending and find little evidence that the fiscal multiplier is higher at the zero lower bound.

[28] For a discussion of the economic mechanisms behind such results, see Woodford (2011).

[29] Erceg and Lindé (2012) also find larger multipliers at the zero lower bound, provided that the size of fiscal stimulus is small. As the size of the stimulus gets larger (Erceg and Lindé use a threshold value of 1.2 percent of GDP, for example), they find the multiplier falls because the period during which the economy is constrained by the zero lower bound is shortened.

[30] Similarly, Afonzo et al. (2011) look at the United States, United Kingdom, Germany, and Italy between 1981 and 2009 and find higher multipliers during periods of financial stress.

Confidence

Multiplier estimates can also vary as a consequence of how changes in fiscal policy affect people's confidence about the future of the economy. For example, using a VAR approach, Bachmann and Sims (2012) find that increases in government spending during downturns boost consumer confidence, which, in turn, increases multipliers. Moreover, they find that such increases in spending, often geared toward public investment, boost long-term productivity. As a result, they argue the increase in confidence reflects that productivity boost, rather than pure sentiment.

Other research suggests that changes in fiscal policy can have a different effect on confidence. Motivated by a growing body of literature that suggests uncertainty negatively affects economic activity, Alloza (2014) uses both SVAR and narrative approaches to examine whether fiscal policy is more effective in tranquil times ("low uncertainty") than in more uncertain times ("high uncertainty"). He finds smaller multipliers in the more uncertain periods and identifies households' confidence as the key variable in explaining that result: An increase in government spending in such times confirms people's views about economic weakness and results in a decline in consumer spending.[31]

Some research even suggests that changes in fiscal policy can affect people's confidence in a way that produces negative multipliers. For example, Corsetti et al. (2013) outline what they call "extreme cases" in which an increase in government spending threatens government solvency. In such cases, they find that the multiplier could be negative because the increased risk of a sovereign default reduces private-sector demand. They also suggest that this process could work in the other direction in the case of fiscal consolidation: If such consolidation reduces the risk of a sovereign default, then that policy change could bolster economic activity.[32]

However, much of the recent literature looks skeptically at the notion of expansionary fiscal consolidations. For example, although Alesina and Ardagna (2010) provide some evidence from OECD countries that fiscal consolidation has sometimes resulted in an output expansion, two subsequent reports by analysts at the International Monetary Fund (Guajardo et al. 2011; International Monetary Fund 2010) find that consolidation more typically reduces output and that measures used in the earlier study bias the results toward overstating expansionary effects. Moreover, Perotti (2011) looks closely at four case studies involving expansionary fiscal consolidations (Denmark, 1983–1986; Ireland, 1987–1989; Finland, 1992–1998; Sweden, 1993–1998) and concludes that three of the expansions were driven by currency depreciation and an export boom, not by a boost in confidence, while the fourth case—the Danish expansion—was short-lived (and was followed by a loss of competitiveness and a six-year slump).

[31] Of course, one could provide a plausible interpretation had Alloza found the opposite results; for example, in that case one could argue that fiscal stimulus reduces uncertainty and boosts confidence by limiting the damaging hysteresis effects that can occur in a downturn. For a discussion of hysteresis and fiscal policy, see DeLong and Summers (2012).

[32] For a similar analysis, see Müller (2014). See also Alesina and Ardagna (2010), who suggest that fiscal adjustment could be expansionary if people believe that fiscal tightening represents a change in regime that eliminates the need for larger, more disruptive adjustments in the future. To be sure, effects on confidence—or on similar psychological dimensions, such as uncertainty (Blanchard 1990) and expectations (Bertola and Drazen 1993; Sutherland 1997)—are not the only possible explanations for a negative multiplier. For example, Corsetti et al. (2013) highlight the effect of changes in fiscal policies on private-sector funding costs (interest rates and credit risk premiums). However, much academic and policy attention has focused on the "confidence channel," especially in the case of fiscal consolidations. See, for example, Perotti (2011) and Chinn (2013).

IV. How Can Multiplier Estimates Be Used to Analyze U.S. Economic Policy?

Despite economists' disagreement about the size (and even the direction) of the multiplier, informed policymaking requires sound estimates of the economic effects of proposed fiscal policy actions. CBO, a nonpartisan agency within the legislative branch of the U.S. government, regularly confronts that challenge. CBO's mission is to provide Congress with objective, independent, and timely information and analyses. Consistent with its mandate, CBO makes no recommendations; but it is often asked to analyze the potential role and efficacy of fiscal policy options in influencing output and employment.

Methods and Policy Details

CBO uses estimates of the fiscal multiplier to analyze the impact that fiscal policy action has on economic output by means of its influence on the overall demand for goods and services.[33] Although much of the research on the size of fiscal multipliers focuses on multipliers associated with increased government spending and large-scale tax cuts, CBO is asked to analyze the economic impacts of a wide array of possible fiscal policy changes. To bridge that gap, the agency uses an estimation method that can accommodate different policy details.

CBO's fiscal multiplier is the product of two separate effects. In particular, CBO decomposes the multiplier into a direct effect (the effect of a dollar of transfers or spending on the demand for goods and services) and an indirect effect (the effect on output that arises when the direct effects propagate throughout the economy). Using that approach, the effect on output of a dollar change in fiscal policy can be written as follows:

($1 Change in Budgetary Cost) $*$ [Fiscal Multiplier] =

($1 Change in Budgetary Cost) $*$ [(Direct Effect on Demand) $*$ (Indirect Effect on Demand)] = Change in Output.

The direct effect of a change in fiscal policy depends on the policy details. In the case of a dollar increase (decrease) in government purchases, the direct effect is 1 because demand increases (decreases) by a dollar. In the case of a dollar increase (decrease) in taxes or transfer payments, the direct effect can vary considerably across fiscal policy provisions (largely because they affect people with different characteristics and may be seen as more or less persistent, resulting in different responses, as discussed above). For example, CBO's analysis of ARRA relies on estimates of direct effects for eight major tax and transfer provisions of that legislation (Congressional Budget Office 2014a).

[33] CBO analyzes the effects of changes in federal fiscal policies on the economy in the short term and the longer term. In the short term, changes in fiscal policies affect economic output primarily by influencing the demand for goods and services. In the longer term, a period in which CBO assumes that actual output is close to potential output, changes in fiscal policies affect output primarily by altering the incentives for individuals and businesses to work, save, and invest. If the labor market is sufficiently tight, changes in incentives to work also can affect output and employment in the short term, but this effect has usually been small in CBO's analyses.

The indirect effect of a change in policy offsets or enhances the direct effect. For example, the direct effects of lower taxes or higher government spending are magnified when stronger demand for goods and services prompts businesses to increase investment and hire more workers than they otherwise would. In the other direction, the direct effects are muted if—for example—higher government borrowing caused by tax cuts or spending increases leads to higher interest rates that discourage ("crowd out") spending on investment and durable goods such as cars (because higher interest rates raise the cost of borrowing by households and businesses).[34] Thus, the indirect effect represents the total change in output per dollar of direct effect on demand.

Given the wide range of multiplier estimates and the uncertainty about the economic relationships that underlie their estimation, CBO uses a range of estimates in its analyses (often in conjunction with a central estimate). That range encompasses a broad spectrum of economists' views about the underlying economic relationships and is informed by results generated by macroeconometric models, time series models, and DSGE models. In particular, the upper portions of CBO's ranges are based mainly on macro models developed by Macroeconomic Advisers and IHS Global Insight; the lower ends are based mainly on the literature using time series models; and CBO relies on DSGE models primarily to help understand the economic and behavioral mechanisms that underlie estimates in the empirical literature (such as anticipation of policy action, as discussed in Section III) and to gauge how changes in business and consumer behavior may affect multipliers.

CBO's analysis of ARRA illustrates the results that can be produced by combining estimates of direct and indirect effects (Congressional Budget Office 2014a). In particular, CBO's ARRA report presents a range of fiscal-multiplier estimates for each major provision of that legislation (see Table 1). In that report, purchases of goods and services by the federal government had the highest estimated fiscal multiplier (estimates ranged from 0.5 to 2.5) and a set of corporate tax provisions had the lowest estimated multiplier (estimates ranged from 0 to 0.4).[35]

Economic Conditions and Confidence

Reflecting CBO's assessment of the literature surveyed in Section III, the magnitudes of the multiplier that the agency uses vary with economic conditions. For example, when output is well below its potential and the Federal Reserve's response to changes in fiscal policies is likely to be limited (such as in recent years when unemployment was elevated, inflation was low, and the Federal Reserve's ability to reduce interest rates was constrained because those rates were already near zero), CBO estimates that multipliers are larger than when output is close to or above its potential and the Federal Reserve responds more fully to counteract the effects of changes in fiscal policies.

[34] Private-sector spending could also be "crowded out" through other channels besides an increase in interest rates. For example, activities spurred by stimulative fiscal policies could reduce production elsewhere in the economy if they used scarce materials or workers with specific skills and thereby created bottlenecks that hindered other production. As with crowding out caused by rising short-term interest rates, crowding out caused by production bottlenecks has probably been much smaller during the most recent U.S. recession and slow recovery (because of high unemployment and a large amount of unused capital) than it might be during other periods. Another channel for crowding out is that some people will respond to a fiscal stimulus by cutting back their spending in anticipation of higher taxes in the future (as mentioned in the previous section).

[35] For other CBO analyses of the economic effects of fiscal policies, see, for example, Congressional Budget Office (2012; 2014b). Also, for discussions of the economic effects of federal investment, see Congressional Budget Office (2013, pp. 4–5).

Table 1.
Ranges for U.S. Fiscal Multipliers

	Estimated Multipliers	
Type of Activity	**Low Estimate**	**High Estimate**
Purchases of Goods and Services by the Federal Government	0.5	2.5
Transfer Payments to State and Local Governments for Infrastructure	0.4	2.2
Transfer Payments to State and Local Governments for Other Purposes	0.4	1.8
Transfer Payments to Individuals	0.4	2.1
One-Time Payments to Retirees	0.2	1.0
Two-Year Tax Cuts for Lower- and Middle-Income People	0.3	1.5
One-Year Tax Cut for Higher-Income People	0.1	0.6
Extension of First-Time Homebuyer Credit	0.2	0.8
Corporate Tax Provisions Primarily Affecting Cash Flow	0	0.4

Source: Congressional Budget Office (CBO).

Note: The estimates above were produced for CBO's analysis of the American Recovery and Reinvestment Act of 2009.

CBO recently published a range of estimates for changes in output resulting from a dollar increase (decrease) in aggregate demand (see Table 2).[36] In the case of tax cuts and increases in transfer payments, those ranges represent the "indirect effect" portion of the fiscal multiplier; and in the case of a change in government purchases, the ranges represent the entire fiscal multiplier (because the direct effect equals 1 for such purchases). When output is well below its potential and Federal Reserve responses are likely to be limited, CBO estimates that a dollar increase (decrease) in demand will increase (decrease) output over four quarters—beginning in the first quarter in which a direct effect occurs—and that the cumulative effect on GDP over that period will range from 0.5 (which means the direct effect is muted) to 2.5 (which means the direct effect is magnified).

In contrast, when output is close to its potential and the Federal Reserve responds more typically to changes in fiscal policies, CBO estimates that a dollar increase (decrease) in demand will have effects over eight quarters. Over the first four quarters, CBO estimates that the cumulative effect on output will be similar to when output is well below potential, but the cumulative effect on GDP over eight quarters ranges from 0.2 to 0.8 (as shown in Table 2). Those values are smaller than when output is well below potential because the economic impact of changes in interest rates grows over time and output in quarters five through eight moves in in the opposite direction of its initial path.

CBO's analyses are also informed by the literature on multipliers and confidence (reviewed in Section III). In particular, although CBO has estimated that the multiplier is not negative currently, the agency recognizes there can be situations that would cause multipliers to be negative. Indeed, that issue was explored in a report CBO published in 2010 (Congressional Budget Office 2010).

[36] CBO expects that the economic effects of changes in fiscal policies are roughly symmetric, meaning that under similar economic conditions the size of the fiscal multiplier is the same for stimulative polices (such as increases in government spending or decreases in taxes) as for contractionary policies (such as decreases in government spending or increases in taxes).

Table 2.
The Effect of a $1 Increase in Aggregate Demand Over Eight Quarters

	When Output Is Well Below Potential And Federal Reserve Responses Are Limited		When Output Is Close to Potential And Federal Reserve Responses Are Typical	
Quarter	Low Estimate	High Estimate	Low Estimate	High Estimate
1	0.50	1.45	0.50	1.43
2	0	0.60	-0.03	0.48
3	0	0.30	-0.04	0.10
4	0	0.15	-0.05	-0.10
5	0	0	-0.06	-0.30
6	0	0	-0.06	-0.28
7	0	0	-0.05	-0.25
8	0	0	-0.05	-0.25
Cumulative Effect After 8 Quarters	0.50	2.50	0.17	0.83

Source: Congressional Budget Office (CBO).

Notes: CBO published these estimates on October 11, 2012, as a supplement to Felix Reichling and Charles Whalen, Assessing the Short-Term Effects on Output of Changes in Federal Fiscal Policies, CBO Working Paper 2012-08 (May 2012). In that data release, "When Output Is Well Below Potential . . ." is described as "When Short-Term Interest Rates Are Close to Zero" and "When Output Is Close to Potential . . ." is described as "When Short-Term Interest Rates Are Not Close to Zero." See www.cbo.gov/publication/43278.

There are no effects after eight quarters.

V. Summary and Conclusion

The Great Recession sparked wide interest in the economic effects of fiscal policy. That recent interest is reflected in an ongoing debate over the size of the fiscal multiplier. This survey article addressed three questions: What models do economists use to estimate that multiplier? Why do estimates of it vary widely? And how can economists use those estimates to judiciously analyze U.S. economic policy?

Three kinds of models are often used to generate estimates of the fiscal multiplier: macroeconometric forecasting models, time series models, and DSGE models. Each has strengths and limitations. For example, estimates generated by macroeconometric models benefit from being grounded in historical data and economic theory, but they also might be unreliable when policies or economic conditions differ substantially from the past.

A key finding above is that the variation in multiplier estimates cannot be explained entirely by economists' use of different types of models. Estimates vary widely primarily because analysts use a variety of estimation methods and because estimates can depend on the details of fiscal policy, the nature of economic conditions, and how fiscal policy affects confidence in economic activity.

Consistent with that finding, CBO varies its multiplier ranges for different economic conditions. CBO's approach to estimating the fiscal multiplier involves first distinguishing between the direct and indirect effects of fiscal policy changes and then combining estimates of both effects. The result is set of ranges informed by a variety of models and the rapidly expanding body of literature.

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